

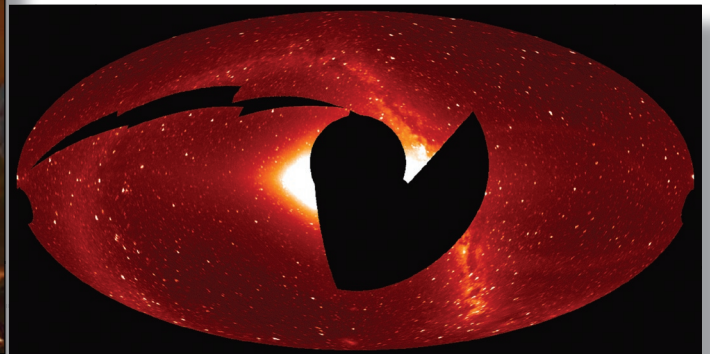


# Air Force Research Laboratory|AFRL

*Science and Technology for Tomorrow's Air and Space Force*

## **Success Story**

### **SOLAR MASS EJECTION IMAGER LAUNCHED ON SPACE TEST PROGRAM'S CORIOLIS SATELLITE**



Distinguishing faint coronal mass ejections (CMEs) from the bright celestial background is difficult, requiring the Solar Mass Ejection Imager (SMEI) to achieve 0.1% photometry. Detection and tracking of earth-directed CMEs will help protect space assets and communications.

CMEs can cause geomagnetic storms on earth, and fast CMEs can drive shock waves. These phenomena initiate effects adverse to military and civilian spacecraft and ground-based systems including increases in trapped magnetospheric particles, degraded satellite communication and surveillance systems, increased drag, and destructive surges in power grids. Advanced warning will permit preventive measures to mitigate their effects.



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### **Accomplishment**

The Space Vehicles Directorate's Space Weather Center of Excellence previously launched the SMEI on the Space Test program's Coriolis Satellite (see photo) to detect and track CMEs propagating from the sun to the earth. Since CMEs are a major cause of space weather effects on earth, SMEI's successful operation will significantly improve space weather forecasts. SMEI images the entire sky in white light every orbit with three baffled charge-couple-device cameras, while occupying a circular, sun-synchronous (830 km) polar orbit.

Since launch, SMEI has detected over a dozen CMEs, including some earth-directed, "halo" CMEs that caused geomagnetic storms at earth.

SMEI will produce 1- to 3-day forecasts of geomagnetic storms by tracking CMEs from the sun to the earth. SMEI's all-sky images will also aid astronomers and astrophysicists in understanding solar processes and detecting astronomical phenomena.

The photo on the right is the first all-sky image produced from SMEI data. The directorate will make available all-sky images on the Web in late 2003.

### **Background**

A team of scientists and engineers from the directorate, the University of California at San Diego, and the University of Birmingham in the United Kingdom, designed and constructed the SMEI experiment. The US Air Force, the National Aeronautics and Space Administration, and the University of Birmingham are providing financial support for SMEI.

### **Additional information**

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-VS-14)

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